Amendment to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A bulk CMOS or NMOS device resistant to total dose radiation failures due to charge build up in a field oxide, the device comprising:

   a Si substrate;

   two or more FETs on said substrate;

   a field oxide region separating each FET; and

   a negative voltage source for applying a steady negative back bias to a NMOS region of said substrate and <u>for increasing</u> ~~to increase~~ the threshold voltage of <u>said</u> ~~the~~ field oxide region to reduce leakage currents due to radiation damage in said field oxide region thereby mitigating total dose radiation effects; and

   wherein a bulk CMOS or NMOS device does not include an insulator layer beneath said FETs.
2. (Previously presented) The device of claim 1, wherein said back bias is less than the breakdown voltage of drain-substrate and source-substrate junctions.
3. (original)The device of claim 1, wherein said back bias is between about –5 V and about –0.1 V.
4. (original) The device of claim 1, wherein said back bias is between –3 and about –1 V.
5. (original) The device of claim 1, wherein said CMOS device is engineered to have a threshold voltage within a selected operating range while said steady negative voltage is applied.
6. (original) The device of claim 5, wherein said operating range is between 0 V and 0.8 V.
7. (Currently Amended) A method for operating a bulk CMOS or NMOS device to resist total dose radiation effects to charge build up in a field oxide, said method comprising the steps of:

selecting a maximum ionizing radiation dose for operation of said bulk CMOS or NMOS device, wherein said CMOS or NMOS device comprises a Si substrate; two or more FETs on said substrate; a field oxide region separating each FET; a negative voltage source for applying a steady negative back bias to a NMOS region of said substrate and for increasing ~~to increase~~ the threshold voltage of the field oxide region to reduce leakage currents due to radiation damage in said field oxide region thereby mitigating total dose radiation effects, and wherein a bulk CMOS device does not include an insulator beneath said FETs; and

determining and applying said negative back bias to said substrate of NMOS components of said bulk CMOS or NMOS device, wherein said negative back bias is sufficient to essentially eliminate leakage currents due to total dose radiation in said field oxide region of said CMOS or NMOS device thereby providing hardness against said maximum ionizing radiation dose.

8. (canceled)

9. (canceled)

10. (original) The method of claim 7, wherein said CMOS or NMOS device is engineered to have a threshold voltage within a selected operating range while said steady negative voltage is applied.

11. (original) The method of claim 10, wherein said operating range is between 0 V and 0.8 V.

12. (New) A bulk CMOS or NMOS device resistant to total dose radiation failures due to charge build up in a field oxide, the device comprising:

a Si substrate;

two or more FETs on said substrate;

a field oxide region separating each FET; and

a means for applying a steady negative back bias to a NMOS region of said substrate and for increasing the threshold voltage of said field oxide region to reduce leakage currents due to radiation damage in said field oxide region thereby mitigating total dose radiation effects; and

wherein a bulk CMOS or NMOS device does not include an insulator layer beneath said FETs, and

wherein said means is a negative voltage source.